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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/920,341	08/01/2001	Byung J. Choi	5119-08301	4146

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EXAMINER

NGUYEN, SANG H

ART UNIT

PAPER NUMBER

2877

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Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 09/920,341	<b>Applicant(s)</b> CHOI ET AL.	
	<b>Examiner</b> sang nguyen	<b>Art Unit</b> 2877	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 01 December 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-3, 8-13, 17-21, 26-31, 35, 36 and 246-256 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 246-256 is/are allowed.
- 6) ☒ Claim(s) 1-3, 8-13, 18-21, 26-31 and 36 is/are rejected.
- 7) ☒ Claim(s) 17 and 35 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>12/03 &amp; 06/02</u> . | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Response to Amendment***

The present Office action is made in response to Applicant's elected restriction Group I filed on 11/07/03. It is noted that the present application contains claims 1-3, 8-13, 17-21, 26-31, 35-36, and 246-256 and claims 4-7, 14-16, 22-25, 32-34, and 37-245 have been canceled by the Preliminary Amendment filed on 02/21/02 (claims 38-120 and 122-245) and elected restriction filed on 11/07/03 (claims 4-7, 14-16, 22-25, 37 and 121).

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1, 19, and 246 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 1, 19, and 246; the phrase "positioning the patterned template and the substrate in a space relationship to one another" is unclear because what applicant means "a space relationship to one another", it is whether "the patterned template", or "the substrate", or "another the patterned template and another the substrate".

Claims 1 and 19 recite the limitation "the spacing" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim.

Claim 246 recites the limitation "the template" and "the substrate" in line 2. There is insufficient antecedent basis for this limitation in the claim.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-2, 18-20, and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsugu et al (U.S. Patent No. 5,148,036) in view of Miyatake (U.S. Patent No. 5,074,667).

Regarding claims 1, 18-19, and 36; Matsugu et al discloses a method of determining a spacing between a patterned template and a substrate, comprising:

- positioning the patterned template considered to be a patterned mask (1 of figure 2 and col.1 lines 20-26) and the substrate or substrate (2 of figure 2 and col.5 line 17) in a spaced considered to be a predetermined interval relationship to each other such that a gap is created between the patterned template and the substrate (col.1 lines 20-26 and col.6 lines 1-5);
- applying light (10a of figure 2) to the patterned template (1 of figure 2) and the substrate (2 of figure 2) by a light source (10 of figure 2);
- monitoring or measuring light reflected (10a' of figures 2 and 7) from a surface of the patterned template (1 of figure 2) and the substrate (2 of figure 2); and

- determining a distance between the surface of the patterned template (2 of figure 2) and the substrate (1 of figure 2) based on the monitored light by a CPU (102 of figure 2 and col.1 lines 10-53 and col.4 lines 10-40, and col.17 lines 20-65). See figures 1-11.

Matsugu et al teaches all of figures in claimed invention except for the light comprises a plurality of wavelengths. However, Miyatake teaches that it is known in the art to provide applying light (4 of figure 2) to the patterned template considered to be patterned mask (14 of figure 2) and the substrate (15 of figure 2) by an illumination optical system (5 of figure 2), wherein the light comprises a plurality of wavelengths (col.14 lines 55-60), monitoring light reflected by an image linear sensor (6 of figure 2) from a surface of the patterned template (14 of figure 2) and the substrate (15 of figure 2), and determining a distance (18 of figure 2) between the surface of the patterned template (14 of figure 2) and the substrate (15 of figure 2) based on the monitored light by a signal handling apparatus (30 of figure 2). See figures 1-37.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify a method of determining spacing between a patterned template and a substrate of Matsugu et al with applying light to the patterned template and the substrate, wherein the light comprises a plurality of wavelengths as taught by Miyatake for the purpose of detecting accuracy a gap between the mask and wafer with light intensity of image spot varies.

Regarding claims 2 and 20; Matsugu et al discloses a CPU (102 of figure 2) for determining an error signal considered to be gap error (col.9 line 33 to indicate  $\Delta z$ ) from

a photodetector (8 of figure 2), wherein the error signal  $\Delta z$  corresponds to the difference between a desired distance considered to be a predetermined correct gap (col.9 lines 15-16) between the patterned template and the substrate and determined measured distance from photodetector (8 of figure 2) between the patterned template and the substrate (col.9 lines 14-55).

**Claims 3, 8-13, 21, 26-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsugu et al in view of as applied to claims 1 and 19 above, and further in view of Ishibashi et al (U.S. Patent No. 5,515,754) and Uchida et al (U.S. Patent No. 5,179,863).**

Regarding claims 3 and 21; Matsugu et al discloses all of features in claimed invention except for at least one actuator for adjusting the distance or gap between the patterned template and the substrate. However, Ishibashi et al teaches that it is known in the art to provide at least one actuator (15 of figure 1) for adjusting the distance or gap between the patterned template (17 of figure 1) and the substrate (16 of figure 1). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify a method of determining spacing between a patterned template and a substrate of Matsugu et al with at least one actuator for adjusting the distance or gap between the patterned template and the substrate as taught by Ishibashi et al for the purpose of adjusting and controlling position distance between patterned mark and the substrate.

Regarding claims 8 and 26; Matsugu et al discloses the CPU (102 of figure 8) for determining the distance between the patterned template (1 of figure 8) and the

substrate (2 of figure 8) at a plurality of locations considered to be two points of the patterned template (1 of figure 8) and the substrate (2 of figure 8) and determining whether the surface of the patterned template (1 of figure 8) and the substrate (2 of figure 8) are parallel based on the two distance determinations or the plurality of distances. See figures 8-9.

Regarding claims 9-10 and 27-28; Matsugu et al teaches that the error signal corresponds to a relative movement between the surface of the patterned template (1 of figure 2) and the substrate (2 of figure 2) by a stage driver (101 of figure 2) and sending the error signal from the photodetector (8 of figure 2) to the stage driver (101 of figure 2) for adjusting the relative position of the surface of the patterned template (1 of figure 2) and the substrate (2 of figure 2) to achieve a substantially parallel.

Regarding claims 11-13 and 29-31; Matsugu et al discloses all of features in claimed invention except for determining distances at least three or more non-colinear locations between the patterned temple and the substrate and sending error signal to the actuator for adjusting relative movement between the patterned template and the substrate. However, Uchida et al teaches that it is known in the art to provide for determining distances at least three or more non-colinear locations (figures 2 and 7) between the patterned temple (35 of figures 2 and 7) and the substrate (25 of figure 2) and sending error signal (figure 2) to the actuator (26, 36 of figure 1) for adjusting and controlling relative movement between the patterned template (35 of figure 1) and the substrate (25 of figure 1). See figure 1-3 and 7. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify a method of

determining spacing between a patterned template and a substrate of Matsugu et al with determining distances at least three or more non-colinear locations between the patterned temple and the substrate and sending error signal to the actuator for adjusting relative movement between the patterned template and the substrate as taught by Uchida et al for the purpose of adjusting and controlling position distance between patterned mark and the substrate.

***Allowable Subject Matter***

Claims 246-256 are allowed.

The following is a statement of reasons for the indication of allowable subject matter: as independent claim 246, the prior art of record, taken alone or in combination, fails discloses or render obvious a method of determining a spacing between a template and a substrate with a material being disposed between the template and the substrate comprising all the specific elements with the specific combination including of determining a magnitude of the spacing between the template and the substrate based on the monitored light by obtaining data representative of the intensity of at least some of the wavelength associated with the monitored light and determining a wavenumber associated therewith, wherein the wavenumber is a function of refractive index of the refractive light and the wavelength of the refractive light with the magnitude being a function of wavenumber in combination with the rest of the limitation of claim 246.



**Claims 17 and 35 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.**

The prior art of record, taken alone or in combination, fails discloses or render obvious a method of determining spacing between a patterned template and a substrate comprising all the specific elements with the specific combination including of determining the distance between the surface of the patterned or planar template and the substrate having obtaining data representative of the intensity of at least some of the wavelengths of the light reflected, calculating a wavenumber, wherein the wavenumber is a function of the refractive index of a material disposed between the template and the substrate and the wavelength of the refractive light, and calculating the distance between the patterned template and the substrate, wherein the distance between the patterned template and the substrate is a function of the wavenumber and the intensity of the reflected light corresponding to the wavenumber in set forth limitation of claims 17 and 35 in combination with rest of the limitation of independent claims 1 and 19, respectively.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Resnick et al (6,517,977) discloses lithographic template and method of formation and use; Suda et al (5,148,037) discloses position detection method and apparatus; Uchida et al (4,848,911) discloses method for alignment first

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and second objects relative to each other; Feldman et al (4,326,805) discloses method and apparatus for aligning mask and wafer members; Frosch et al (4,070,116) gap measuring device for defining the distance between two or more surfaces; Uda (JP 63 138 730) discloses gap alignment device; Hirakawa et al (JP 57 007 931) discloses method for measuring gap; or Okabe (JP 55 088 332) discloses method of mask alignment.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Sang Nguyen whose telephone number (571) 272-2425. The examiner can normally be reached on Monday through Friday from 8:30 am to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the Examiner's Supervisor, Mr. Frank Font, can be reached on (571) 272-2415. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

SN

Nguyen/ sn

April 15, 2004



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